

CASE SERIES

Application of a Simple, Cost-Effective Surgical Obturator Technique in Post-Maxillectomy Rehabilitation, in a Resource-Challenged Clinical Setting

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Received: September 5th, 2021Accepted: November 2nd, 2021<https://doi.org/10.5281/zenodo.6964907>

DISCLOSURE: No conflict of interest or financial support from any source to any of the authors

INTRODUCTION

Sinonasal cancers are rare, accounting for less than 1% of the total burden of cancers in medical practice.¹ However, it is known to

ABSTRACT

Background: Cancers of the nose and paranasal sinuses are not uncommon in our setting and most patients present very late, amplifying the challenge of post-surgical prosthodontics rehabilitation. Management of these patients require multi-disciplinary approach involving the otorhinolaryngologist, maxillo-facial surgeon, oncologist, radiotherapist, prosthodontist, psychologist and speech therapist, who may not be available in some centres in low income Countries. Availability and affordability of prosthodontic materials is another confounding factor to grapple with, in our resource-challenged hospital setting.

Objective: To present a simple, innovative, very cost-effective, surgical obturator and its application technique, with good outcome, in the rehabilitation of post-maxillectomy patients in our centre.

Methodology: Three patients with stage 4 sino-nasal carcinoma (T₄N₀M₀) had total or extended total maxillectomy done. A soft, pliable polyethylene sheet, with hemi-palate shape was sutured to occlude the oro-naso-antral defect and allowed in-situ for four to eight weeks.

Results: All the patients tolerated the stent very well, commenced oral feeding 24 hours after surgery, achieved reasonable speech for communication and had no challenge of regurgitation of fluid or food into the nose. Cosmetic outcome was very satisfactory.

Conclusion: Absence of prosthodontist and surgical obturator materials should no longer be an excuse for failing to do a much needed surgical treatment of these cancer patients. The technique is recommended in view of the enormous cost benefit, even in centres that are financially comfortable.

Key words: Maxillectomy, Obturator, Polyethelene sheet, Cost-effective, Facial cosmetics

account for about 31% of head and neck tumours, being the third most common carcinomas of the head and neck region in our environment². Late presentation is an

unfortunately common issue worldwide, hence most cases require total or extended total maxillectomy as the desired treatment option.^{1,2}

The head and neck surgeons are faced with the daunting challenge of post-operative prosthodontic rehabilitation of these patients, as very large defect occurs following surgical extirpation. Also, limited excision of palatal and alveolar cancers creates an oronasal or oroantral defects which must be immediately closed during surgery. Closure may not be surgically possible or advisable, necessitating the use of non-biological materials to achieve closure in the post-operative period. These materials are fashioned into obturators to fit the palatal arch, with stability and effective closure of the surgical defect.

The indications of immediate insertion of an obturator following maxillectomy include the following: elimination of hypernasalis and speech and communication interruption in the immediate post-surgery; the prevention of leakage or regurgitation of fluid and food into the nasal and postsurgical antral cavity; To prevent interruption of deglutition process as a result of palatal defect; and reduction of cosmetic deformity after surgical extirpation of tumour mass.

Others include: overcoming of psychological effect of surgical removal of large bulk of tissue in the midface and presence of oronasal-antral defect; permitting of early oral feeding and early removal of naso-gastric feeding tube; and support of packs of the surgical cavity used to control bleeding, support skin graft, prevent enophthalmos and reduce cosmetic facial deformity.^{3,4,5,6,8}

Prosthodontics practice has been in existence for several centuries initially confined to closure of congenital palatal defects. Ambroise Pare was credited to be the first to use artificial means to close palatal defects, as early as 1500s.⁶ Since then there has been evolution and addition to the number of materials in use today. The history of prosthodontics has been concisely summarized by Mayank Singh *et al.* At present, materials used in modelling maxillary obturators include the following: Acrylic-resin- a mixture dental cement and natural hydrocarbon molecule; Gutta percha- a purified, coagulated latex, thermoplastic, rigid and biologically inert material produced from sap of palaguium and *Payena* trees grown in Malaysia and Indonesia (It is a mixture of cis- and trans- polyisoprene); Osteo-integrative metals- e.g. cobalt-chromium; and Silicon.^{4,5,6,7,9,10}

Prosthodontic rehabilitation of the maxillary defect is carried out in three phases.^{3,10} The first phase involves intra-operative insertion of surgical obturator. This is allowed in-situ for seven to ten days. The surgical obturator is designed as an edentulous disc or plate with vacuum bulbous superior portion to fill the surgical cavity and a false ridge. It is patterned to conform to a pre-surgical impression of the defect in the palatal arch.

The second phase is the insertion of temporary postsurgical or interim obturator. This is designed to be dentulous with three or four front teeth for better cosmetics and psychological impact. The patient wears this for at least six months during the period of wound healing, organization and dimensional contracture.

The third phase involves insertion of definitive obturator, when healing, organization and contracture has settled or chemotherapy or chemoradiotherapy has been completed.

Thus, the provision and availability of prosthodontic services is very essential prior to initiation of surgical treatment of maxillary cancers. It contributes significantly towards the overall cost of treatment. Even when the best of the surgeon is available, he cannot embark on total or extended maxillectomy without the assurance of availability of maxillary obturator.

Faced with a challenge of failure of the prosthodontist to provide surgical obturator at the middle of total maxillectomy procedure, we fashioned a polyethylene sheet to the shape of the hemi-palate and sutured it to the normal palate and the upper lip margin in a mattress fashion. The outcome was very exciting, prompting us to adopt it routinely as the phase one (surgical obturator) technique.

We hereby present the outcome of three of such patients from a series of eight patients so far done. The outcome of the procedure in all the patients are similar, hence we selected the youngest, middle-aged and the oldest among the series. Details of the technique is here below elaborated.

SURGICAL TECHNIQUE OF FIXING POLYETHYLENE SHEET MAXILLARY OBTURATOR

We use medical urine bag to design the obturator. Its characteristics that made it ideal are its tensile strength, softness and pliability; it has remained over eight weeks in-situ in one patient without significantly losing its properties.

There is no special pre-operative preparation other than the usual preparation of a patient for total maxillectomy. The need for a pre-operative prosthodontic review is not needed for this technique. The double wall of the bag is used as a single reinforced sheet, cut and trimmed to size and shape of the palatal defect. After removing the diseased maxilla and clearing every visible pathologic tissue, two mattress sutures (nylon-1) are fixed through the sheet and palate muco-periosteum, about one centimetre along the cut edge of the contra-lateral palate. The suture traverses the full thickness of the palatal muco-periosteum. A third suture is fixed at the apex of the sheet and the incisor alveolus. The curved margin of the sheet is fixed to the lip edge of the soft tissue flap, in a mattress fashion. Thus, the sheet underlays the edges of the maxillary defect and shields them from oral cavity content. The only challenge encountered in the process is during fixing the prosthetic sheet to the contralateral plate. Using a strong, short semi-circular needle makes this stage easier.

After successfully fixing the sheet, nasopharyngeal airway is inserted through the contra-lateral nasal cavity for a seamless nasal breathing during the post-operative period as the surgical cavity will remain packed with gauze. The surgical cavity is packed with ribbon gauze impregnated with 10% betadine surgical solution via the nose and the facial segment of the incision. The facial incision is finally sutured fully. We do not insert nasogastric feeding tube, since oral feeding commences twenty-four hours post-operatively. We ensure that the facial contour and cosmetics after packing is exactly what we expect when healing is completed. That is how we gauge the amount of gauze packed in the

surgical cavity. We do not apply skin grafting under the cheek flap and we consider it unnecessary and addition of extra morbidity and cost (See figures 1, 2 and 3 below).

Post-operative management of the patient is modified by the technique via early commencement of oral feeding after twenty-four hours, elimination of nasogastric tube feeding which is mandatory when conventional surgical obturator is used. The surgical pack is removed from fifth to seventh day after surgery. The prosthesis is removed ten days to eight weeks after surgery when interim Obturator is ready for fixing by the Prosthodontist. We observed no complication related to the technique and the prosthesis are well tolerated by the patients.

CASE PRESENTATIONS:

Case 1

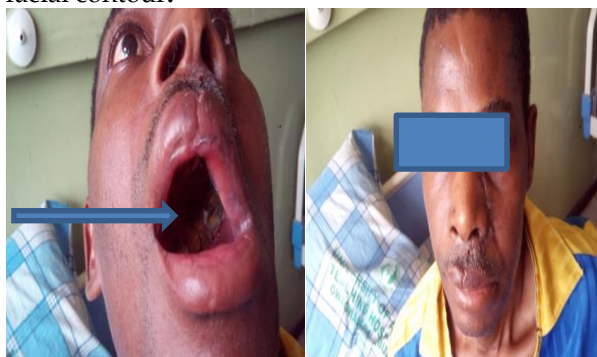
A fifty-five-year-old male private security guard, presented to our clinic with a two years' history of left nasal blockage, eight months' history of progressive growth in the nose, associated with epistaxis, mucopurulent rhinorrhoea and facial pain. He has been treated by a general practitioner before presenting to us. Clinical assessment revealed haemorrhagic soft tissue mass filling and protruding out from the anterior nares of the right nose. There was extensive involvement of the upper alveolus, soft and hard palate with right cheek fullness and mild tenderness. The nasal septum was deviated to the right by not eroded. Vision was preserved in both eyes. He had no palpable cervical lymphadenopathy. Nothing remarkable was made on review of systems.

The CT-SCAN showed complete invasion of the right maxillary antrum, ethoidal sinuses and anterior walls of the sphenoidal sinuses but no orbital and pterygoid involvement. Histology of nasal mass biopsy revealed the tumour to be well differentiated squamous cell carcinoma. He was fully worked up for total maxillectomy.

Figure 1. (a) Pre-operative picture of a fifty-nine-year-old male patient with left maxillary tumour. The right hemipalate is not involved but overshadowed by the mass. (b) two weeks' post-operation, showing surgical obturator in-situ (arrow)



Figure 1c. Five weeks' post-operative picture with surgical prosthesis still in-situ (see Arrow). Patient on chemotherapy at this stage. Note the acceptable facial contour.



Case 2

A thirty-six-year-old male, junior administrative civil servant, who presented with a four-year history of nasal blockage, two year slowly progressive nasal mass associated

with bleeding from the right nose, painless right cheek swelling, bulging of right eyeball and diplopia but good vision for about one-year duration prior to presentation. Examination revealed nasal cavity soft tissue filling the fossa and displacing the nasal septum to the left. There was proptosis and upward displacement of ipsilateral eyeball with intact visual acuity. The palate was invaded and bulging into the oral cavity with complete disorganization of right upper dental arch. There was no palpable cervical lymphadenopathy. Plain X-ray of the paranasal sinuses showed marked bony erosion and opacity of the maxillary and ethmoidal sinuses walls. Patient could not afford CT-SCAN investigation of the sinuses. Histology report of nasal mass biopsy showed the tumour to be poorly differentiated squamous cell carcinoma.

He was worked for total maxillectomy and had surgery, with application of the above surgical obturator technique, with satisfactory recovery and cosmetic appearance. He carried the obturator for eight weeks four days due to inability to afford Interim Obturator early enough. Post-operative outcome was satisfactory.

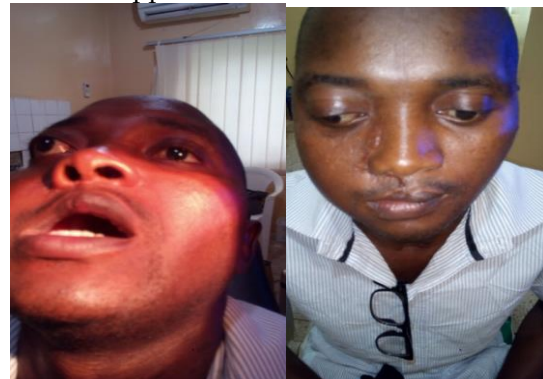
Case 3

A 67-year old general medical practitioner, presented with right-sided two-year history of epistaxis, nasal blockage, mucopurulent rhinorrhoea, six months' painful ulceration of the roof of the mouth and right lower retromolar trigone area. He developed inability to open the mouth and was unable to chew and teach solid food. There was significant loss of weight.

Figure 2a. The surgical obturator in-situ (arrow) two weeks after right total maxillectomy in a thirty-six-year-old male patient with right orbital proptosis, vision intact.



Figure 2b. Seven weeks' post-operative period, surgical obturator has been removed to enable insertion of interim obturator. Patient receiving chemotherapy at this stage. Note satisfactory facial cosmetic appearance



On examination, he was found to have soft tissue mass filling the nasal cavity, extension and ulceration of the palatal component into the oral cavity, involvement of the right lower lip retromolar trigone, cheek tissue involvement and marked trismus. He was mildly anaemic but had no cervical lymphadenopathy. CT-SCAN showed erosion of the orbital floor with preservation of

the periosteum, extension to the ipsilateral sphenoidal sinus and the pterygoid fossa.

He had extended total maxillectomy, incorporating our surgical obturator technique and subsequent post-operative chemotherapy. The surgical obturator was removed six weeks after surgery and commencement of

chemotherapy, when satisfactory wound healing had taken place. Patient had a satisfactory post-surgical outcome and no complication related to the technique.

Figure 3. A 67-year-old male patient with stage four tumour of the right maxillary antrum, with cheek soft tissue, retro molar and adjoining lower lip invasion, severe trismus, pterygoid fossa and muscles invasion. (a) Modified Weber- Fergusson's incision (b) Maxilla and tumour extension excised, blue arrow points to the left incisor tooth. (c) Red Arrow showed the surgical obturator sheet being fixed in place. (d) surgical cavity packed, naso-pharyngeal airway placed in-situ, cheek incision sutured

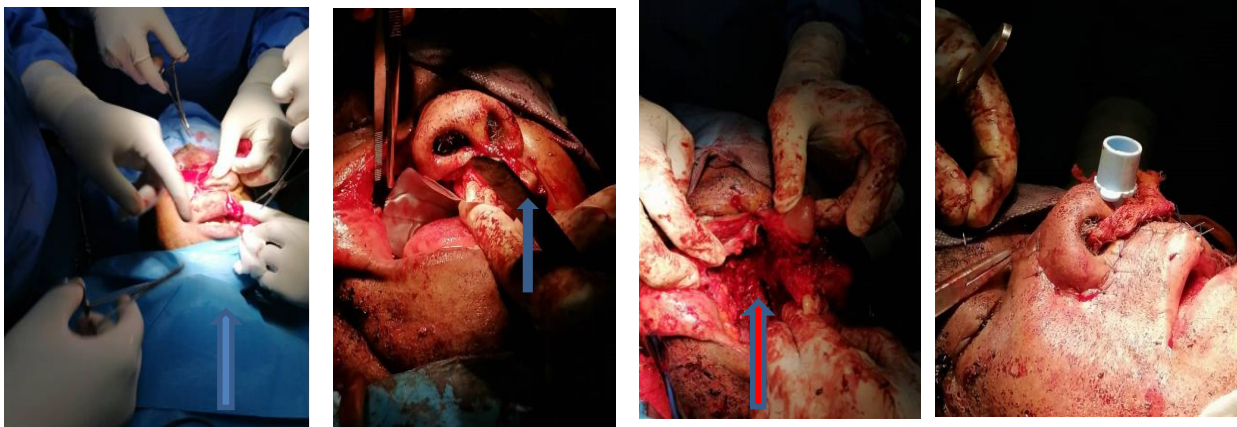
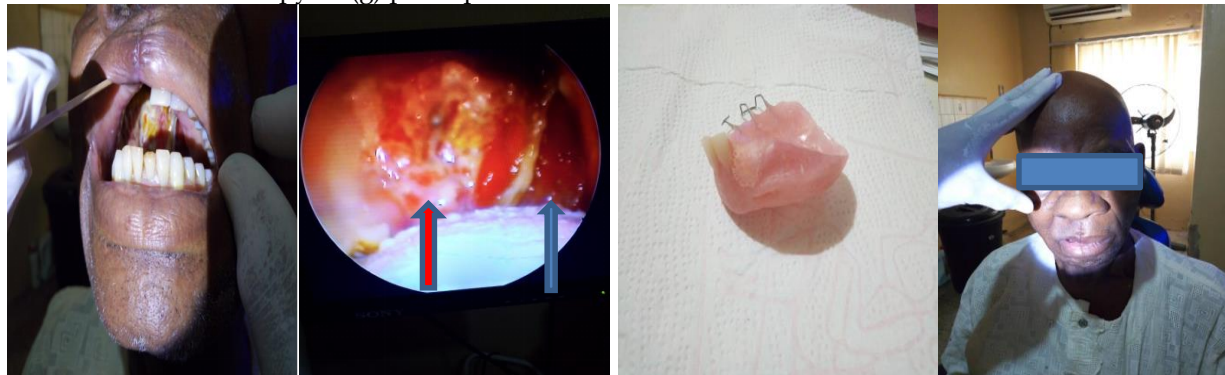


Figure 4. Six weeks' post-surgery: (e) surgical obturator removed, (f) surgical cavity inspected, Red arrow points to surgical cavity, blue arrow points to nasopharynx f) Interim Obturation ready for fitting. Patient on Chemotherapy. (g) post-operative facial contour outcome



DISCUSSION

About 85-90% of the patients present at the late stages of the disease.^{1,2} Early case detection are often incidental findings during management of suspected sinusitis. These have been attributed to the close similarity of clinical presentation of rhinosinusitis and early stages of sinonasal carcinomas as well as hidden anatomical peculiarity of the nose and paranasal sinuses which hinders early tumour detection. Irrespective of the stages of the disease process, surgery is the mainstay in its management.

All our cases had total or extended total maxillectomy, and so required full maxillary obturator to separate the oral cavity from the surgical cavity. Our technique involves the use of soft, pliable polyethylene or silastic sheet, devoid of a bulbous component as surgical obturator. The conventional surgical obturators are solid, relatively heavy material made from acrylic, resin, ceramic dental cement or gutta-percha. They are usually prepared pre-operatively by the prosthodontist or intra-operatively. Though an accidental discovery, it appears to have a lot of advantage over the conventional obturators. These include, availability without an input from a prosthodontist, simple to prepare on-table and very cost-effective when compared with other materials used in obturator fabrication. This technique allows introduction of oral feeding twenty-four hours after surgery, in contrast to the use of conventional materials which allow oral feeding from seven to ten days. It is very comfortable and acceptable to the patients and leaves the edges of the wound better covered, promoting better healing.

Despite the absence of the vacuous bulbous component, we have not recorded any unacceptable cosmetic facial outcome or enophthalmos, indicating that the bulbous components of conventional surgical obturator may not be indispensable after all. What determines the facial cosmetic appearance from our work is the amount of gauze used and duration of packing, as outlined in our technique above.

In resource-challenged setting, without prosthodontic manpower and materials available, our technique enables the surgeon to carry out the needed surgical treatment and later refer the patient to another centre for prosthodontics rehabilitation. In so doing the limited, poorly or unevenly distributed human and material resources are maximally utilized for the best benefit of the patients with cancers of the nose and paranasal sinuses.

CONCLUSION

Absence of prosthodontist and surgical obturator materials should no longer be an excuse for failing to do a much needed surgical treatment of these cancer patients. The technique is recommended in view of the enormous cost benefit, even in centres that are financially comfortable

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